Mr. Thomas Bergin read the following communication from Dr. Thomas Woods of Parsonstown, on a new photographic process, which he calls the Catalysotype. Mr. Bergin also read two letters from H. Fox Talbot, Esq. (M. P.) to Dr. Woods, and his answer.

While investigating the property that sugar possesses, in some instances, of preventing precipitation, I noticed that when syrup of ioduret of iron was mixed in certain proportions with solution of nitrate of silver, the precipitate was very quickly blackened when exposed to the light, and I thought that, if properly used, it might be employed with advantage as a photographic agent. If not entirely without profit, it would hardly repay the trouble of reading the history of all the experiments I tried in order to prove whether or not this idea were correct, for there were many difficulties to be overcome, and unexpected hindrances to be surmounted, before I could be certain of success. However, the results at which I have arrived make me hope that my trouble has not been thrown away, and that a photographic process has been discovered, which is more manageable, and more satisfactory, than any which has before been used; and I think that the pictures produced by it are more minutely and delicately brought out, and the time for their production at least not longer than is required by any other method.

To enter very minutely into the particulars, or to explain the *rationale* of the process would be too tedious; however, it is so simple, that those who will feel any pleasure in trying it will, I am sure, easily succeed, and to attempt any explanation of its theory would, in the present state of our knowledge of light, be advancing a mere hypothesis; I will, therefore, only state generally the method in which the paper is prepared, and then briefly giving my reasons for such parts of the process as are not at first sight obvious, will thereby enable the experimenter to be guarded against the failures that these precautions are intended to overcome.

Let well-glazed paper (I prefer that called wove post) be steeped in water to which hydrochloric acid has been added in the proportion of two drops to three ounces. When well wet, let it be washed over with a mixture of syrup of ioduret of iron half a drachm, water two drachms and a half, tincture of iodine one drop. When this has remained on the paper for a few minutes, so as to be imbibed, dry it lightly with bibulous paper, and being removed to a dark room, let it be washed over evenly, by means of a camel-hair pencil, with a solution of nitrate of silver, ten grains to the ounce of distilled water. The paper is now ready for the camera. The sooner it is used the better; as when the ingredients are not rightly mixed, it is liable to spoil by keeping. The time I generally allow the paper to be exposed in the camera varies from two to thirty seconds; in clear weather, without sunshine, the medium is about fifteen seconds. With a bright light, the picture obtained is of a rich brown colour; with a faint light, or a bright light for a very short time continued, it is black. For portraits out of doors, in the shade on a clear day, the time for sitting is from ten to fifteen seconds. If the light is strong, and the view to be taken extensive, the operator should be cautious not to leave the paper exposed for a longer period than five or six seconds, as the picture will appear confused from all the parts being equally acted on. In all cases, the shorter the time in which the picture is taken the better.

When the paper is removed from the camera no picture is visible. However, when left in the dark, without any other preparation being used, for a period which varies with the length of time it was exposed and the strength of the light, a negative picture becomes gradually developed, until it arrives at a state of perfection which is not attained, I think, by photography produced by any other process.* It would seem

* The picture, when developed, is not readily injured by exposure to moderate light; it ought, however, to be fixed, which may be done by washing it with a solution of bromide of potassium, fifteen or twenty grains to the ounce, or iodide of potassium, five grains to the ounce. It may either be applied with

as if the salt of silver, being slightly affected by the light, though not in a degree to produce any visible effect on it if alone, sets up a catalytic action, which is extended to the salts of iron, and which continues after the stimulus of the light is withdrawn. The catalysis which then takes place has induced me to name this process, for want of a better word, the Catalysotype. Sir J. Herschell and Mr. Fox Talbot have remarked the same fact with regard to other salts of iron, but I do not know of any process being employed for photographic purposes which depends on this action for its development, except my own.

My reason for using the muriatic acid solution, previous to washing with the ioduret of iron, is this: I was for a long time tormented by seeing the pictures spoiled by yellow patches, and could not remedy it, until I observed that they presented an appearance as if that portion of the nitrate of silver which was not decomposed by the ioduret of iron had flowed away from the part. I then recollected that Sir J. Herschell and Mr. Hunt had proved that iodide of silver is not very sensitive to light, unless some free nitrate be present. I accordingly tried to keep both together on the paper, and after many plans had failed, I succeeded by steeping it in the acid solution, which makes it freely and evenly imbibe whatever fluid is presented to it. I am sure that its utility is not confined to this effect, but it was for that purpose that I first employed it. My reason for adding the tincture of iodine to the syrup is, that having in my first experiments made use of, with success, a syrup that had been for some time prepared, and afterwards remarking that fresh syrup did not answer so well, I examined both, and found in the former a little free iodine; I therefore added a little tincture of iodine

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a camel-hair pencil, or by immersion. The picture must then be well washed in water, to remove the fixing material, which would cause it to fade by exposure to light.

with much benefit, and now always use it, in quantities proportioned to the age of the syrup.

The following hints will, I think, enable any experimentor to be successful in producing good pictures by this process. In the first place, the paper used should be that called "wove post," or well-glazed letter-paper. When the solutions are applied to it, it should not immediately imbibe them thoroughly, as would happen with the thinner sorts of paper. If the acid solution is too strong, it produces the very effect it was originally intended to overcome; that is, it produces yellow patches, and the picture itself is a light brick-colour, on a yellow ground. When the tincture of iodine is in excess, partly the same results occur; so that if this effect is visible, it shews that the oxide of silver which is thrown down is partly re-dissolved by the excess of acid and iodine, and their quantities should be diminished. On the contrary, if the silver solution is too strong, the oxide is deposited in the dark, or by an exceedingly weak light, and in this case blackens the yellow parts of the picture, which destroys it. When this effect of blacking all over takes place, the silver solution should be weakened. If it be too weak, the paper remains yellow after exposure to light. If the ioduret of iron be used in too great quantity, the picture is dotted over with black spots, which afterwards change to white. If an excess of nitrate of silver be used, and a photograph immediately taken before the deposition of the oxyde takes place, there will be often, after some time, a positive picture formed on the back of the negative one. The excess of the nitrate of silver makes the paper blacker where the light did not act on it, and this penetrates the paper, whereas the darkening produced by the light is confined to the surface. The maximum intensity of the spectrum on the paper, when a prism of crown glass is used, lies between the indigo and blue ray. The difference of effect of a strong and weak light is beautifully shewn in the action of the spectrum: that part of the paper which is exposed to the indigo ray is coloured a reddish brown, and this

is gradually darkened towards either extremity until it becomes a deep black.

I have not had many opportunities of experimenting with the Catalysotype, but it certainly promises to repay the trouble of further investigation. The simplicity of the process, and the sensibility of the paper, will, no doubt, make it be extensively used. It has all the beauty and quickness of the Calotype without a tenth of its trouble, and very little of its uncertainty; and, if the more frequent use of it by me, as compared with other processes, does not make me exaggerate its facility of operation, I think it is likely to be practised successfully by the most ordinary experimenters.

SUPPLEMENT TO THE PRECEDING PAPER.

P. S.—Since the preceding Paper was written I have been experimenting with the Catalysotype, and one day having had many failures, which was before quite unusual with me, I am induced to mention the cause of them, for the benefit of subsequent experimenters. The paper I used was very stiff, and highly glazed, so that the solution first applied was not easily imbibed. The blotting-paper was very dry and bibulous. When using the latter, I removed nearly all the solution of iron from the first, and, of course, did not obtain the desired result.

While varying the process in endeavouring to find out the cause just mentioned, I discovered that the following proportions gave very fine negative pictures, from which good positive ones were obtained:—take of syrup of ioduret of iron, distilled water, each two drachms; tincture of iodine, ten to twelve drops: mix. First brush this over the paper, and after a few minutes, having dried it with blotting-paper, wash it over in the dark (before exposure in the camera) with the following solution, by means of a camel-hair pencil:—take of nitrate of silver one drachm; pure water one ounce: mix. This gives a darker picture than the original preparation, and, consequently, one better adapted for obtaining positive ones;

it also requires no previous steeping in an acid solution. To fix the picture, let it be washed, first in water, then allowed to remain for a few minutes in a solution of hydriodate of potassa (five grains to the ounce of water), and washed in water again. The paper I use is the common unglazed copy paper, but such as has a good body. I have tried the same paper with the original preparation, and find it to answer exceedingly well; it does not require in this case, either, an acid solution. The same precautions and hints apply to the amended as to the original process: such as when it blackens in the dark, there is too much caustic used; when it remains yellow, or that it is studded with yellow spots, too much iodine; when marked with black spots, too much iron. It is necessary to mention these, on account of the varying strength of the materials employed.

The following is the correspondence laid before the Academy on the part of Dr. Woods:

"Lacock Abbey, Chippenham,
"11*th March*, 1845.

"Sir,—Excuse my addressing you on the subject of a Paper which you sent to the British Association at York, last September, containing the description of a photographic process.

"Some years ago I described a process for obtaining camera pictures without using any *second wash*. It was described nearly as follows in the specification of my English patent: Take *iodised paper*, wash it with gallic acid, dry it, and keep it in store for subsequent use. This is called *io-gallic paper* from its constituents. When wanted, take a sheet of io-gallic paper, wash it with nitrate of silver, and put it in the camera. The image obtained is generally, at first, invisible, but it rapidly *developes itself* when removed from the camera, requiring no further care, except ultimately to fix it. Instead of gallic acid, sulphate of iron answers the same purpose perfectly. The same effect is very often, but not always, produced in the ordinary Calotype process, which I described in 1841; indeed I discovered it in that way.

"The process which you have called Electrolysotype appears to

me to be strictly analogous to the above. If I comprehend your description, you use an iodised paper in which iodide of iron is employed instead of iodide of potassium.

" You may be quite right in attributing the effects to Electrolysis, but then it follows that my Calotype process, with all its variations, must result from the same cause.

" I am, Sir,

" Your obedient Servant,

" H. Fox Talbot.

"*Dr. Woods.*"

" Lacock Abbey,

"18*th March*, 1845.

" Sir,—I have to acknowledge the receipt of your courteous letter of the 15th instant, upon which I beg leave to make a few observations. In my Calotype process, iodide of silver is decomposed by the joint influence of light and a deoxydising agent (gallic acid). Mr. Hunt has shewn that sulphate of iron may be substituted for gallic acid, and he calls the process so altered Energiatype. But since *tannin* and other substances may also be substituted for gallic acid, each of these variations in the process would require, on the same principle, to have a *separate name*, which would, surely, be inconvenient. In your method, iodide of silver is decomposed by the joint action of light and iron; the three reacting substances being *the same* as in Mr. Hunt's Energiatype; and therefore, imperfect as the theories of photography confessedly are, I cannot persuade myself that a *catalytic* action can take place in your process, *unless* it also takes place in the Energiatype and in my original Calotype process: I therefore cannot help considering these three processes as variations of the same, and not essentially different. I hope, however, you will not consider me as detracting in the least from your valuable labours: my remarks only refer to the *nomenclature* of the science.

If I am not mistaken, the three methods I have named produce pretty nearly identical *results*, though I speak from experience of only two of them, Mr. Hunt's and my own. Both of these are nearly certain in operation, very rapid, giving a camera picture of a bright object in a second of time, and requiring no second wash if enough of the deoxydising agent is employed in the first wash. It is customary to make the *positive* copies on a different paper,

which I have called photogenic drawing-paper, consequently, the *final results* of the two processes cannot anyhow be distinguished.

I thank you for your courtesy in mentioning that you are about to send a Paper on the subject to the Royal Irish Academy by the hands of Dr. Robinson. May I request that this letter and my former one, with the permission of the Academy, may be read to them on the same occasion, if Dr. Robinson will kindly take charge of them. It may be left to their scientific judgment to say whether a new principle is involved or not in your experiments. If any new principle be involved, then a distinctive name, such as you have given, is, of course, desirable,—otherwise it would not be so. I would refer also to the instance of the Daguerreotype, now so differently managed from what it used to be at the time of its first promulgation. It is now at least a hundred times more rapid in its effects, but it still continues to be called the Daguerreotype. On the other hand, I believe it is not affirmed that any process on paper has been discovered more rapid or more certain than the Calotype; I am not aware of any such having been as yet described. We should certainly be very grateful to any one who discovered a more rapid process, depending on new combinations; but if I do not err in defining the Calotype process as depending on a combination of iodine, silver, and a deoxydising agent, your process would be included in that definition, unless good reasons to the contrary could be shewn, all which I willingly leave to the judgment of the scientific world: and, thanking you for your polite attention in so soon answering my last letter,

" I remain, Sir,

" Your's very truly,

" H. Fox Talbot.

" P. S.—If your process does anything which the Calotype cannot do, or does it *better*, I willingly admit its importance; but I apprehend that you are not aware of the facility and rapidity with which our Calotype operations are now conducted. Indeed, that was my chief reason for troubling you with a letter, as your Paper read at the York meeting mentioned the spontaneous development of photogenic images as something new, whereas it is a phenomenon

of very frequent occurrence in the Calotype, and *always* occurs when we use the io-gallic paper."

"PARSONSTOWN,
"*March* 25, 1845.

"SIR,—I am sorry I did not receive your letter before Dr. Robinson left this town, which I should have done, it being dated March 18: I did not get it until March 24. I will, however, forward it to him, and I am sure he will, with his usual kindness, make whatever use of it he thinks right. I will ask him to have it laid before the Academy with my Paper. I agree with the observations you make on my Paper on *general principles*. There is no doubt at all that your Calotype, Mr. Hunt's Energiatype, and my Catalysotype, if I may be allowed, for the present, to call it so, are all pretty similar in their modes of action, and perhaps they all come to the same point in the end,—the decomposition of the salt of silver; but, as I said in my former letter, if new modes of producing this effect were not to be named, why call your process Calotype—why call Mr. Hunt's Energiatype, &c., as they all agree in their general results with the first experiments made with light on the nitrate of silver? Why not regard them all merely as *instances* of the same general principle, and not isolate them, as it were, by designating each by a particular name? You will say now that I agree with your ideas: I always did. I think that cumbering science with a multiplicity of hard names for every particular fact is very bad; but the christening of my process has been forced on me by a similar line of conduct in others; and when a nomenclature sufficiently good appears (a task which I wish you would undertake), I will be the first to blot out the word Catalysotype.

"I do not pretend to any discovery; nor do I think my process, in its chemical character, distinct from the general mass of facts in active chemistry. I merely regard it as a new combination, acting with great facility, very little complication, and, though not involving a new principle, being developed without requiring any second wash, which I looked on as characteristic until you mentioned the io-gallic paper, a process of which I was certainly ignorant before. You mention also Mr. Hunt's Energiatype as being similar to mine; but, as first published, it undoubtedly could have

no claim to the advantages mine possesses, either in facility of execution or rapidity of result. I think he says it requires six or eight minutes to accomplish what mine does in two or three seconds. After my process was published by being read at the meeting of the Association at York, the sulphate of iron was applied to iodised paper, but not before. That proceeding has increased its sensibility, and made it approach in sensibility to mine; but it obviously does not interfere with my right to consider the Catalysotype my own child, and to call it what I please. However, I think all experimentors with light owe you a great debt, and should pay particular attention and respect to your opinion on a subject for which you have done so much; I will, therefore, not insist on adhering to the word Catalysotype, but leave the process to be dealt with as a fact in the general history of active chemistry. For the present the name must be borne with, as my Paper is written and given to Dr. Robinson; but if it ever should be again spoken of, which is perhaps not probable, we will not elevate it to the honour of a distinct prefix.

"I am, &c.

"THOMAS WOODS."

May 26, 1845.

SIR WM. R. HAMILTON, LL.D., President, in the Chair.

A sealed packet was opened, with the consent of Mr. R. Mallet, by order of the Academy, which he had deposited with the Academy at the meeting of the 13th of November, 1843. Mr. Mallet then stated the subject matter of the enclosed document to be certain propositions regarding improved methods of working atmospheric railways, and that his object in calling for the production of the packet upon this evening was to claim his priority of invention, as similar plans have been since proposed by French and English engineers.

A letter from Mr. Clibborn was read by the Secretary, relating to the discovery of certain gold antiquities near Naas.